

## 42nd Annual Conference on Bioassay, Analytical and Environmental Radiochemistry

### Title:

Evaluating the Use of Field Instruments: a Statistical Approach

### Abstract:

Fixed laboratory analyses have frequently been used in preference to field instruments for environmental data collection to support decision making. This preference for fixed laboratory analyses is partly due to the perceived greater precision of fixed laboratory analyses relative to field instrument results.

A statistical model has been developed to address variables such as (1) analytical precision for field instruments and fixed laboratory chemical and radiochemical analyses, (2) cost per analysis, (3) sampling and analysis budgets, (4) statistical distribution of contaminant concentrations, and (5) quantitative decision goals. The model is used to balance analytical method selection against decision performance goals.

Case studies related to the DOE sites at Hanford, Washington and the Los Alamos National Laboratory in New Mexico are used to demonstrate the principles and application of this modeling tool. The case studies address (1) determining the volume of waste that must be removed to meet cleanup goals, (2) waste classification, and (3) verification of cleanup. This statistically based modeling shows that using field instrumentation can be just as suitable to decision making and less costly than fixed laboratory analyses. This statistical model must be used in the context of the data collection planning process where other factors such as method selectivity and detection limits are considered.